

**ABSTRACT OF THE DISCLOSURE**

For a direct oxidation fuel cell system in which the source fuel is diluted with a diluting fluid prior to entering the fuel cell generally, and for a Direct Methanol Fuel Cell System (DMFC) in which the methanol source fuel is diluted with water, the dielectric constant of the fuel mix comprising the source fuel and the diluting fluid is measured to determine the relative proportions of source fuel and diluting fluid within this fuel mix. This measurement may then be used in a feedback loop to control the subsequent mixing of the source fuel with the diluting fluid, and in particular, to adjust the mix in the event the fuel mix is too rich or too dilute as compared to a desired mixing proportion. Additionally, a second dielectric constant measurement is used to determine the source fuel level of a fuel tank providing source fuel to the fuel cell. Finally, an optional telecommunications link is used to automatically order a source fuel refill when the source fuel runs low.